

REMARKS

Claims 1, 3-6, 8, 9, and 11-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Johnson et al., U.S. Patent 6,373,188 (hereinafter "Johnson"). Applicant respectfully traverses the rejection.

Claim 1 and dependant claims

Independent claim 1 recites "a semiconductor light emitting diode . . . having a light-emitting surface . . . and a phosphor layer provided on a first portion of the light-emitting surface, . . . wherein a second portion of the light-emitting surface is without the phosphor layer, and wherein the second portion is substantially surrounded by the first portion." Claim 1 thus requires that a single surface of a single light emitting diode have a phosphor-covered portion surrounding a second, uncovered portion.

In rejecting Claim 1, the Examiner points to Figs. 1 and 2 of Johnson, citing phosphor layer 60 as the first portion and p-contact 38 and n-contact 50 as the second portion. Claim 1 requires that "the second portion is substantially surrounded by the first portion." Thus, the uncovered portion must be substantially surrounded by the covered portion, and the substantial surrounding must be accomplished on a single surface of a single light emitting diode. None of Johnson's figures meet this requirement of claim 1. In Johnson's Fig. 1, phosphor layer 60 is a contiguous rectangular layer, and thus does not surround any uncovered layers on the same surface. In Johnson's Fig. 2, multiple devices are illustrated. Though phosphor layers 60A and 60B of Johnson's Fig. 2 may substantially surround an uncovered region between these phosphor layers, phosphor layers 60A and 60B are disposed on different light emitting diodes. In contrast, the language of claim 1 requires that the surrounding of the uncovered portion by the phosphor covered portion must be accomplished on a single surface of a single light emitting diode. In Johnson's Fig. 3, phosphor layer 82 is

formed along two sidewalls 86A and 86B of a light emitting device. Even if the Examiner considers the surface of insulating layer 98 on which the phosphor layers are formed to be the same surface as the surface on which contact 104 is formed, the phosphor layer still does not substantially surround any uncovered region, as required by claim 1. Accordingly, Johnson does not anticipate claim 1.

Claims 3-6, 8, and 11-13 depend from claim 1 and are therefore similarly allowable.

Claims 4 and 5 recite "the phosphor layer is distributed over a plurality of regions on the light emitting surface" of a light emitting diode. Claims 4 and 5 thus require multiple regions lacking phosphor and substantially surrounded by a phosphor covered region, all on a single surface of a single light emitting diode. Applicants have found no such teaching in Johnson. Accordingly, claims 4 and 5 are allowable for this additional reason.

Claim 6 recites "the second portion without the phosphor layer is at least partly covered with a light-transmitting layer which is capable of spreading light incident on said second portion." The Examiner cites sapphire substrate 26 as this light transmitting layer. However, claim 1, from which claim 6 depends, requires that the first and second portion, thus the phosphor layer and the light transmitting layer, must be on a single surface of a single light emitting diode. Since substrate 26 is clearly attached to a different surface of the device than phosphor layer 30 (Fig. 1), claim 6 is allowable over Johnson for this additional reason.

Claim 11 recites "the second portion is completely surrounded by the first portion." Applicants have found no such teaching in Johnson. Accordingly, claim 11 is allowable for this additional reason.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Duggal et al., U.S. Patent 6,294,800. Duggal et al. is cited as teaching "converting the LED radiation energy with some phosphor compositions produces substantially white light." See Office action, page 3. Duggal et al. adds nothing to the deficiencies of claim 1, from

which claim 2 depends, with respect to Johnson. Claim 2 is therefore allowable over Johnson and Duggal et al. for at least the same reasons that claim 1 is allowable over Johnson.

Claim 9 and dependant claim

Claim 9 recites "providing a semiconductor light emitting diode capable of emitting light of a first wavelength, the semiconductor light emitting diode having a light-emitting surface, and providing a phosphor layer on the light-emitting surface, which phosphor layer is capable of converting light of the first wavelength to visible light of a second wavelength, wherein the phosphor layer is removed from, or not provided on, a portion of the light-emitting surface substantially surrounded by the phosphor layer." Claim 1 thus requires, on a single surface of a single light emitting diode, providing a phosphor layer that substantially surrounds a portion of that single surface. Claim 9 is allowable over Johnson for the reasons discussed above with reference to claim 1.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Nakamura et al., U.S. Patent 5,614,786. Claim 10 depends from claim 9. Nakamura et al. is cited as teaching "phosphor deposited by screen printing." See Office action, page 3. Nakamura et al. adds nothing to the deficiencies of claim 9, from which claim 10 depends, with respect to Johnson. Claim 10 is therefore allowable over Johnson and Nakamura et al. for at least the same reasons that claim 9 is allowable over Johnson.

Claim 14 and dependent claims

Claim 14 is amended to recite "a semiconductor light emitting diode capable of emitting light of a first wavelength, the semiconductor light emitting diode having a light-emitting surface, and a plurality of regions of phosphor provided on the light-emitting surface, wherein the plurality of regions of phosphor are capable of converting light of the first

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wavelength to visible light of a second wavelength and wherein the plurality of regions of phosphor form a chessboard pattern.” Claim 14 thus recites a plurality of regions of phosphor provided on a single surface of a single light emitting device, the plurality of regions of phosphor forming a chessboard pattern.

Applicants can find no teaching in Johnson of a single surface of a single light emitting diode having a plurality of phosphor regions in a chessboard pattern. In the device of Fig. 2, though many phosphor layers 60 are shown, no single light emitting device has multiple phosphor regions. Accordingly, claim 14 is allowable over Johnson.

Claims 15-17 depend from claim 14 and are therefore allowable for at least the same reason as claim 14. Claims 16 and 17 recite a light-transmitting layer on the same surface as the phosphor layer. Applicants have found no such teaching in Johnson. Accordingly, claims 16 and 17 are allowable over Johnson for this additional reason.

Response to Examiner's remarks

In the Response to Arguments section of the office action, the Examiner states that “claim 1 does not claim a single light emitting diode.” The Examiner is correct that claim 1 is not limited to a single light emitting diode. However, the language of claim 1 requires that the first and second portions are on a single light emitting surface. The single light emitting surface is part of a single light emitting diode. See for example, the portion of claim 1 that recites “a semiconductor light emitting diode . . . having a light-emitting surface.” Thus, claim 1 requires that the light-emitting surface containing the first and second portions correspond to a single light emitting diode.

Further, the Examiner states “referring to Fig. 1 of Johnson presented a LED segment ‘with one or more light emitting phosphors’.” It is not clear what is meant by this comment. Applicants note, however, that claims 1 and claim 14 refer to a phosphor layer or phosphor

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regions and describe the arrangement of the phosphor layer or regions on a light emitting surface. The number of different phosphor materials in the phosphor layer or regions is not specified in claim 1 and 14. Similarly, the presence of multiple phosphor materials in Johnson's devices does not alter the arguments made above with respect to Johnson. Whether there is a single phosphor material or multiple phosphor materials in the phosphor layer or phosphor regions of claims 1 and 14 is irrelevant to the fact that Johnson does not teach all the elements of these claims.

In view of the above arguments, Applicants respectfully request allowance of claims 1-6 and 8-17, 20 and 21. Should the Examiner have any questions, the Examiner is invited to call the undersigned at (408) 382-0480.

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